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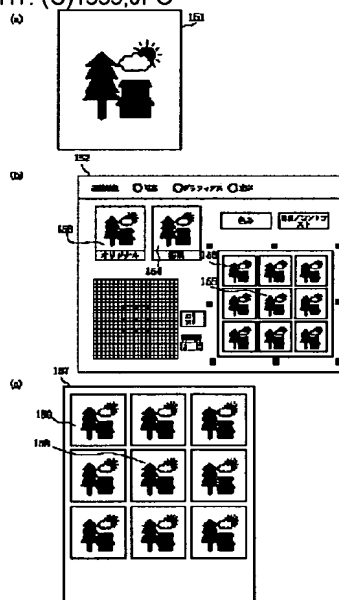
(54) **IMAGE PROCESSING METHOD, DEVICE AND
 RECORDING MEDIUM**

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(57) Abstract:

PROBLEM TO BE SOLVED: To allow a user to simply set a color processing condition by executing plural color processing to the same image through the use of plural displaying color processing conditions based on the instruction of a user so as to parallelly display.

SOLUTION: An image 151 printed by normal printing is adjusted by a user through the use of a thumb nail 156 at a display for adjustment 152 to make a printing image in a desired color. Namely, eight peripheral images are depressed to set the desired image to be current image 155. Then, the user executes adjustment by optionally swathing 'color taste' and 'brightness/ contrast'. At this time the user adjusts while comparing an unadjusted original image 153 and a current image 154. A color processing parameter for printing at this time is converted into coordinate with the color processing parameter for printing of the thumb nail image displayed on a display device by a color adjusting parameter converting part.



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(21)Application number : 09-359803 (71)Applicant : CANON INC
(22)Date of filing : 26.12.1997 (72)Inventor : NAKAJIMA YASUSUKE

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(57)Abstract:

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CLAIMS

[Claim(s)]

[Claim 1] It is the image-processing approach of having the user interface which is made performed and displaying two or more color processings to the same image, and sets up color processing conditions. It has a display mode and a printing mode. In said display mode Using two or more color processing conditions for a display based on directions of a user, to the same image, two or more color processings are performed and it indicates by juxtaposition. In said printing mode The image-processing approach characterized by amending said two or more color processing conditions for a display based on directions of a user on the color processing conditions for printing, performing two or more color processings to the same image using two or more this amended color processing conditions for printing, and making it form in juxtaposition.

[Claim 2] Furthermore, make it correspond to the class of image formation section, and two or more amendment parameters are stored. The class of image formation section is identified and the amendment parameter corresponding to the class of said identified image formation section is chosen from said two or more amendment parameters stored. In said printing mode The image-processing approach according to claim 1 characterized by amending said two or more color processing conditions for a display on the color processing conditions for printing using said selected amendment parameter.

[Claim 3] Said user interface is the image-processing approach according to claim 1 characterized by displaying visually the relation of two or more color processing conditions for a display based on directions of said user.

[Claim 4] It is the image processing system which is made to perform and display two or more color processings to the same image, and sets up color processing conditions. When it has the optional feature which chooses a display mode or a printing mode based on directions of a user and said display mode is chosen When two or more color processings are performed, it indicates by juxtaposition to the same image using two or more color processing conditions for a display based on directions of a user and said printing mode is chosen The image processing system characterized by amending said two or more color processing conditions for a display based on directions of a user on the color processing conditions for printing, performing two or more color processings to the same image using two or more this amended color processing conditions for printing, and making it form in juxtaposition.

[Claim 5] It is the record medium which records the program which a computer can read. Said program It is what realizes the function to perform and display two or more color processings to the same image, and to set up color processing conditions. When a display mode or a printing mode is chosen based on directions of a user and said display mode is chosen When two or more color processings are performed, it indicates by juxtaposition to the same image using two or more color processing conditions for a display based on directions of a user and said printing mode is chosen The record medium characterized by being the program which realizes amending said two or more color processing conditions for a display based on directions of a user on the color processing conditions for printing, performing two or more color processings to the same image using two or more this amended color processing conditions for printing, and making it form in juxtaposition.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image-processing approach, the equipment, and the record medium which perform an image processing.

[0002]

[Description of the Prior Art] In the conventional image equipment represented by the printer equipment which performs image formation based on the color picture data generally inputted, by considering the RGB value which is a chrominance signal in a monitor etc. as an input, color processing is performed to this signal and it changes into the CMYK signal which are output chrominance signals, such as a printer.

[0003] In color printer equipment etc., subtractive color mixture of the ink of the CMYK signal acquired by the signal transformation mentioned above is carried out, and color reproduction is performed.

[0004] Here, the conventional example of the image processing which changes the data of the RGB multiple value which is image data into the CMYK binary data which are the output image of a printer is described.

[0005] Drawing 19 is the block diagram showing the flow of the image processing in the conventional image-processing section 13. About image data, it is sent to the image-processing section 13 among the input data analyzed by the analysis section 11. In drawing, 131 is the color processing section 131 which forms the image-processing section. Although color processing is first performed by the adjustment color transducer 191 in the color processing section 131, about this, it mentions later. Next, processing is performed in the RGB->CMYK transducer 192. This processing performs conversion to a CMYK multiple-value signal from a RGB multiple-value signal, and includes well-known processing of color matching (matching), brightness concentration conversion, masking, etc. That is, this processing changes luminance signals, such as RGB which is a subject-copy image, into concentration signals, such as CMYK which is a signal for printer processing. This CMYK multiple-value signal is Half next. It is convenient Half in case a printer prints in the Toning section 193. It is changed into a Tone signal. A binary signal is explained to an example in this invention, and application is possible also by multiple-value signals, such as four values, an octal, and 256 values. This Half In the Toning section 193, the signal with which processing was performed is sent to the latter printing section, and is printed. The case where the color in the image printed here differs from a desired color is seen plentifully. Although various factors are involved in this, when the condition of the printing section when designing the color processing parameter in the RGB->CMYK transducer 192 mentioned above as an example changes with long term deterioration, environmental change, etc., the above-mentioned phenomenon occurs. Moreover, as another example, even if the original printing result is obtained, also when it differs from a user's favorite color, it thinks.

[0006] A means to perform color adjustment conventionally supposing such a case is offered.

[0007] Color adjustment is conventionally performed as conversion to a RGB multiple value from a RGB multiple value in the adjustment color transducer 191 in drawing 19. This sets up an adjustment value in the setting section 15 first, and this adjustment value is stored in the color tone ready parameter storing section 194. The adjustment color transducer 191 performs color conversion using this color tone ready parameter. The example of the here conventional setting section 15 is shown in drawing 18.

[0008] In drawing 18, color adjustment is performed on RGB code level, and 181 is a setting screen displayed on displays, such as a monitor. 182 is a slide bar at the time of adjusting RED, and a user moves said slide bar top for a carbon button 183 to right and left using pointing devices, such as a mouse. A carbon button 183 is the location set by the initial state, and 184 is in the condition of not adjusting. It is so weak that a carbon button 183 is moved to the left in a RED component, and a RED component is strongly adjusted, so that it is made to move to the right. A slide bar for 185 and 186 to adjust GREEN similarly,

respectively, a carbon button, and 187 and 188 are the slide bars and carbon buttons for adjusting BLUE, respectively.

[0009]The adjustment value set up according to R, G, and B by strength to the input RGB multiple-value signal in the setting section 15 is stored in the color tone ready parameter storing section 194. The adjustment color transducer 191 performs color conversion using this color tone ready parameter. Although this processing creating a linear transformation table which weakens a RED component according to this setup, and performing it using this table, when a setup which weakens for example, a RED multiple-value signal is carried out etc. is mentioned, a detail is not mentioned here.

[0010]When the image-processing section 13 inputted image data and formed the data for the output to the printing section using drawing 18 and drawing 19 above, the conventional example in the case of performing color adjustment was shown.

[0011]

[Problem(s) to be Solved by the Invention]However, there are the following troubles in the technique mentioned above.

[0012]In the preceding paragraph of the conversion to CMYK from RGB in color processing, there is a means to set up according to R, G, and B by strength with a slide bar to the RGB multiple-value signal which is an input signal, as a color tone ready means in case it originates in the inner factor of differing from the favorite color of external factors, such as long term deterioration and an environmental change, or a user and the color in the printed image differs from a desired color as mentioned above.

[0013]In such an adjustment device, it is the work most difficult also for the user who has not only a general user but ****-knowledge in that of ****-knowledge to operate an input signal RGB according to an individual, and to obtain a desired color, and it requires great trial-and-error.

[0014]That is, in order to obtain a desired color to a printing result, after adjusting RGB, it prints again, and after adjusting RGB further, it is necessary to repeat several times the process of printing again. Moreover, in this adjustment, in order to perform color adjustment in the balance of RGB on the strength, even if **** and lightness will be adjusted to coincidence and the adjustment value near completion to some extent is acquired, there is evil in which **** and lightness collapse, by having operated a little either of the RGB.

[0015]This invention is made in view of an above-mentioned trouble, and aims at a user enabling it to set up color processing conditions simply.

[0016]Moreover, it aims at enabling it to set color processing conditions as high degree of accuracy more by forming in juxtaposition two or more images by which color processing was carried out in consideration of ***** of a display image and a formation image.

[0017]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, the image-processing approach of this inventionIt is the image-processing approach of having the user interface which is made performed and displaying two or more color processings to the same image, and sets up color processing conditions. It has a display mode and a printing mode. In said display modeUsing two or more color processing conditions for a display based on directions of a user, to the same image, two or more color processings are performed and it indicates by juxtaposition. In said printing modeSaid two or more color processing conditions for a display based on directions of a user are amended on the color processing conditions for printing, two or more color processings are performed to the same image using two or more this amended color processing conditions for printing, and it is characterized by making it form in juxtaposition.

[0018]

[Embodiment of the Invention]With reference to an accompanying drawing, 1

operation gestalt concerning this invention is explained to a detail below.

[0019]In addition, although the color printer is used for the example in each example explained below, it cannot be overemphasized that it can carry out similarly about image formation equipments, such as a monochrome printer and a copy-ed [color] machine.

[0020]Moreover, although binary-ized processing is used for an example with each operation gestalt, it can carry out similarly about the multiple-value printer using other transform processing, such as formation of 4 values, and octal-izing.

[0021]Moreover, although two sorts, a "tint" and "lightness/contrast", are used for an example as a class of color processing parameter with each operation gestalt, it is applicable similarly about other color processing parameters, such as "saturation" and "concentration."

[0022]<First operation gestalt> the image processing system of this operation gestaltAn analysis means to analyze image data called data and the image data of command format for output controls which are sent out from application, An expansion means to develop to the data for an output according to the result analyzed by this analysis means, An image-processing means to perform an image processing to image data in the case of expansion with this expansion means, A color processing means to constitute a part of image-processing means concerned, and to perform color processing to image data, The color processing parameter change means which changes the color processing parameter used according to a setup of a setting means to constitute said a part of image-processing means, and to mention later in said color processing means, Said a part of image-processing means is constituted, and a setup of a setting means to mention later is followed. An image Enlarging or contracting and an image processing means to perform image processing of copying, A parameter conversion means to change into the color processing parameter for printing the color processing parameter which constituted said a part of image-processing means, and carried out point ** according to the setup of a setting means to mention later, A setting means for the user of this image processing system to perform a setup about an image processing using an external input unit according to the purpose of use, The set point storing means for storing the value set up by this setting means, It has the display means for outputting the image data for indicating equipments developed by said expansion means to an external indicating equipment according to assignment of said parameter selection means, and the printing means for outputting the image data for printing developed by said expansion means to an external airline printer.

[0023]In case said expansion means performs expansion to the data for a display based on the result of having analyzed the image data inputted from application with the analysis means (thumbnail), said image data is reduced to indicating equipments with said image processing means, and this contraction image is reproduced further, and it develops using the color processing parameter which gave the variation, and it displays on an external indicating equipment in juxtaposition with said display means.

[0024]In case color adjustment is performed looking at this display image with said setting means, one image on this display screen is chosen with this setting means, and according to this actuation, a color processing parameter is changed with said color processing parameter change means, and it develops similarly, and displays on an external display with said display means.

[0025]In case this image by which it was indicated by two or more is printed (catalog print), after processing it into the image data for printing with said image processing means, it develops with said expansion means using said color processing parameter, and these expansion data are outputted to an external airline printer with said printing means. Since it matches with the color processing parameter used in case it indicates by juxtaposition with a color tone ready parameter conversion means at said display, the color processing parameter for printing at this time is changed. That is, with a color tone ready parameter

conversion means, it amends in said color processing parameter so that the difference between the images looked at by two or more images obtained by said thumbnail and the same difference may be acquired also in a catalog print.

[0026]This conversion is needed with the difference in the color space of RGB which is a chrominance signal for a display, and CMYK which is a chrominance signal for printing. That is, even when the difference in vision is among two or more screens on the display screen, for example in the above-mentioned thumbnail, it can see for not being seemingly reflected in printing, even if the difference in vision may not be acquired and it amends by the thumbnail in this case on the printing screen by the catalog print. This is compensated with a color tone ready parameter conversion means, and it amends in said color processing parameter so that the difference between the images looked at by two or more images obtained by said thumbnail and the same difference may be acquired also in a catalog print.

[0027]In case final printing is obtained, it changes into the color processing parameter for printing with the above-mentioned color tone ready parameter conversion means, and develops with said expansion means using this parameter, and the final color processing parameter for a display set up with said setting means to former image data is outputted to an external airline printer with said printing means.

[0028]Thus, with this operation gestalt, it has the approach of performing a thumbnail, the method of performing a catalog print, a method of changing the color tone ready parameter for a display for thumbnails into printing, and a method of performing color tone ready processing to a former image using the color tone ready parameter which changed into printing the color tone ready parameter finally chosen.

[0029]Therefore, it becomes intelligible [the color adjustment for obtaining a desired color] easily sensuously [selection], and a user can set up the efficient image processing according to the purpose of use.

[0030]Hereafter, the configuration of this operation gestalt is explained to a detail using a drawing.

[0031]Drawing 1 is the block diagram showing the configuration of the image processing system of 1 operation gestalt concerning this invention.

[0032]In drawing 1, it is application, as for 1, for the image processing system of this operation gestalt to do image data, and for a user do drawing edit of 2, and 3 is an airline printer which forms a printing image based on the output data from this image processing system, 4 is a display which forms a display image based on the output data from this image processing system, and 5 is an input unit for performing various setup from the outside.

[0033]11 is the analysis section 11 which analyzes the image data transmitted from application 2. The processing which changes the characteristic image symbolic convention of application into the image data processed within this image processing system is included in this analysis. 12 is the expansion section 12 which forms an expansion means to change into the output data used in case the output section which mentions later by performing various processings according to the analysis by said analysis section 11 outputs. 13 is the image-data-processing section 13 for being especially in this expansion section 12, and performing processing to image data. 131 is the color processing section 131 which forms the color processing means for performing color processing which is especially in this image-processing section 13, and was mentioned above. 132 is the color processing parameter change section 132 for changing the parameter at the time of being in said image-processing section 13, and said color processing section 131 performing color processing. 133 is the image processing section 133 for processing contraction, expansion, a duplicate, etc. to the image data which is in said image-processing section 13, and is sent from said analysis section 11. 134 is the color tone ready parameter transducer 134 which changes into the parameter for printing the color processing parameter which is in said image-processing section 13, and is used in said color processing section 131.

[0034]14 is the display 14 for displaying said image data and various setting screens which were processed on an external display. 15 is the setting section 15 which performs processing for the user of this image processing system to set up using a mouse or the input unit of the exterior called a keyboard according to an application. It displays graphically as the screen for adjustment, or an output mode setting screen on a monitor by this display 14 and this setting section 15, and a user is made to set up with this operation gestalt. 16 is the set point storing section 16 for storing the set point set up by said setting section 15. 17 is the printing section 17 for outputting the image data for an output developed by said expansion section 12 to the external airline printer 3.

[0035]In addition, above-mentioned each part is controlled by non-illustrated CPU based on the program memorized by storage means by which it does not illustrate [which is connected through the bus].

[0036]In this operation gestalt, an airline printer 3 is a color laser beam printer. The image data outputted is data of the bit map format for 1 page, and is prepared for CMYK4 colors, respectively. The printing section 17 sends out these output data to an airline printer 3, and an airline printer 3 forms an image in a record medium using each ink of C (cyanogen), M (Magenta), Y (yellow), and K (black) which are ink for an output.

[0037]The image-processing section 13 inputs an image chrominance signal from the analysis section 11 at drawing 2, and the flow of the processing at the time of forming the chrominance signal for the output to a display 14 or the printing section 15 is shown.

[0038]First, the information stored in the set point storing section 16 is referred to. The information stored has responded to the setup of a user.

[0039]This screen for adjustment displayed graphically is explained using drawing 9. Drawing 9 is a screen for adjustment displayed on the external display 4 through said display 14. 91 is a field for adjustment and describes drawing 9 to be a thumbnail field henceforth. This thumbnail field 91 displays the image of nine sheets side by side as drawing, and 92 is an image located in the center, and describes it to be a current image henceforth. The current image 92 shows the result of having performed the newest adjustment, and is always located in the center of nine images with this operation gestalt. The image of eight sheets located around the current image 92 is an image which emphasized "red", "yellow", "yellowish green", green ["green"], a "light blue", "blue", "purple", and "pink" to the current image 92, respectively, and the image itself has become a carbon button for a setup. Although this operation gestalt explains using the eight above-mentioned color, it is applicable also with chromatic colors other than these. 93 is the image which strengthened green to the current image 92. A user does the depression of the carbon button shown by the image 93 through said setting section 15 from the input device 5 which is the pointing device represented by the mouse which is an external device, when asking for the image which strengthened green. Screen 93 moves to a current next door and the location of 92 at this depression and coincidence. By having updated the current image 92, the image of eight sheets which emphasized the eight above-mentioned color on the basis of the new current image 92 again is displayed on the outskirts. The current image 92 is set as a desired color by repeating this actuation. 94 is an indicator in which the field which can be adjusted is shown in said thumbnail 91, and describes it as the whole map 94 henceforth. 95 is the cursor 95 which shows the location by which is in a whole this map and it is indicated by current to said thumbnail field 91. That is, the nine points of cursor 95 are equivalent to nine images of the thumbnail field 91. Whenever it adjusts like the above-mentioned in the thumbnail field 91, cursor 95 moves in the whole map 94 top. When cursor 95 arrives at the edge of the whole map 94, the thumbnail field 91 cannot perform adjustment to this direction.

[0040]98 and 99 are carbon buttons which choose whether the color processing

parameter changed in said thumbnail field 91 is made into a "tint", or it is made "lightness/contrast", and have become a toggle switch. Explanation of the thumbnail field 91 mentioned above was an example when a "tint" is chosen, and the image of eight sheets located around the current image 92 was an image which emphasized "red", "yellow", "yellowish green", green ["green"], a "light blue", "blue", "purple", and "pink" to the current image 92, respectively. On the other hand, an example when "lightness/contrast" is chosen is shown in drawing 11.

[0041]In drawing 11, 114 is a thumbnail field lightness / for "contrast" adjustment. This thumbnail field 114 displays the image of nine sheets side by side like drawing 9, and 115 is a current image which is an image located in the center. The current image 92 shows the result of having performed the newest adjustment, and is always located in the center of nine images with this operation gestalt. The image of eight sheets located around the current image 92 is an image to which a longitudinal direction changes contrast and the lengthwise direction changed lightness to the current image 115, respectively, and the image itself has become a carbon button for a setup. 120 is the image which was weak in contrast and strengthened lightness to the current image 115. When a user asks for the color processing in this image, the depression of the carbon button shown by the image 120 is carried out through said setting section 15 from an input device 5. Screen 120 moves to a current next door and the location of 115 at this depression and coincidence. By having updated the current image 115, the image of eight sheets to which contrast/lightness was again changed on the basis of the new current image 115 is displayed on the outskirts. The current image 115 is set as a desired image by repeating this actuation. 116 is a mark with which a lengthwise direction specifies that it is the shaft to which lightness is changed, and 117 is a mark which specifies that a longitudinal direction is the shaft to which contrast is changed. 118 is the whole map 118 which is the indicator in which the field which can be adjusted is shown in said thumbnail field 114. 119 is the cursor 119 which shows the location by which is in a whole this map and it is indicated by current to said thumbnail field 114. That is, the nine points of cursor 119 are equivalent to nine images of the thumbnail field 114. Whenever it adjusts like the above-mentioned in the thumbnail field 114, cursor 119 moves in the whole map 118 top. When cursor 119 arrives at the edge of the whole map 118, the thumbnail field 114 cannot perform adjustment to this direction.

[0042]As explained above, when "lightness/contrast" is changed to a "tint", it changes to the display screen shown in drawing 9 and drawing 11, respectively.

[0043]In drawing 9, 912 is the address display 912 which shows the positional information of KARENTO in the whole map 94. this value -- this example -- x and y -- the value of -ten to 0-+10 is taken, respectively, and 0 which is a core, and 0 correspond to the condition of not adjusting. 911 is the adjustment width-of-face setting section 911 which sets up adjustment width of face, and sets up the width of face between KARENTO and the circumference in said cursor 95. These are explained to a detail using drawing 10. Drawing 10 takes out only the whole map part in drawing 9. drawing 10 (b) -- drawing 9 R> 9 -- the same -- x and y= -- it is the example of 0, 0, and the adjustment width of face 3. On the other hand, drawing 10 (a) is the example which set the adjustment width-of-face setting section 103 as 5. namely, current one which is the core of cursor -- the distance with 101 and 102 which are the circumference and which shows green, for example is set to five on a whole map. Thus, when adjusting in a thumbnail field from increasing adjustment width of face to 5 from 3, the degree of the adjustment performed by one action increases. Conversely, the degree of the adjustment performed by one action becomes small, and it becomes easy to perform fine tuning by decreasing adjustment width of face. Drawing 10 (c) is an example which cursor moves by adjusting in said thumbnail 91. drawing -- setting -- current one -- 107 is moving to the location of x, y= +3, and +3. The adjustment width of face in this case is 3.

[0044] Thus, with the whole map 94 and cursor 95, the adjustment for which the current line requires a user can be known clearly.

[0045] Here, the value in the above-mentioned address display 912 and the adjustment width-of-face setting section 911 is memorized about each of a "tint" and "lightness/contrast", and this setup is displayed according to a change.

[0046] In drawing 9, 96 shows the original image before adjusting and 97 is the image processed using the same color tone ready parameter as the current image 92.

[0047] 913 is the field which sets up a color tone ready object, and has a photograph, graphics, and three selectors of an alphabetic character. This selector is [any one] selectable. That is, other objects cannot be chosen when a photograph is chosen, as shown in 910. When the candidate for adjustment is changed in drawing 9 here, adjustment is performed only to the object object chosen in 91 thumbnails or 96 or 97 screens now. Thereby, the color adjustment of a user according to objects, such as a photograph, graphics, and an alphabetic character, is attained. Here, the color tone ready value according to this object is memorized about each of two sorts of color processing parameters, such as a "tint" mentioned above and "lightness/contrast", and this setup is displayed according to a change.

[0048] As explained until now, color conversion is performed in the location of the arbitration of thumbnail adjustment of a "tint" and "lightness/contrast", i.e., a whole map top, using the color tone ready parameter corresponding to 1 to 1.

[0049] Here explains correspondence with a "tint", the whole map in "lightness/contrast", and a color tone ready parameter using drawing 12, drawing 13, and drawing 14. Drawing 12 is drawing showing the color space in "tint" adjustment. That is, this adjustment is first changed into the color a on rg space (r, g, b) from the color A on RGB space (R, G, B). This is based on a degree type.

[0050] $r = R / (R + G + B)$

$g = G / (R + G + B)$

$b = 1 - r - g$ adjustment is performed on this rg space, and a' (r', g', b') is obtained.

[0051] This adjustment on rg space is adjustment as shown in drawing 13 (a). In drawing 13 (a), 131 is white which shows un-adjusting. In this example, as mentioned above, "red", "yellow", "yellowish green", green ["green"], a "light blue", "blue", "purple", and "pink" are used as eight colors of "tint" adjustment, and these are equivalent to eight top-most vertices shown in drawing 13 (a). that it can carry out and being except the above and having described adjustment 8 color previously, -- this -- it is exactly using colors other than the above for eight top-most vertices. However, these colors need to be continuing annularly in ****. A basic setting point is first placed on the line which connects said white131 to these eight top-most vertices in drawing 13 (a), and a subcoordinating point is kept on the line which connects between these basic setting points of level [degree]. By these, although two or more coordinating points are kept on rg space, this activity may be done at equal intervals and weighting may be performed. For example, in a case at equal intervals, it computes by $2/3 * \text{yellow}[3] + 1/3 * \text{red}[3]$ on the line which connects the basic setting point that the color tone ready parameter of 132 emphasizes yellow and red by 3 level.

[0052] Drawing 13 (b) is drawing which matched this coordinating point with the whole map. That is, the coordinating point mentioned above is made to correspond to a square map simply, 133 corresponds to white131 and 132 corresponds to 134.

[0053] Adjustment on rg space is performed using the color tone ready parameter beforehand computed as mentioned above corresponding to the whole map, and a' (r', g', b') is obtained.

[0054] Next, in drawing 12, it changes into A' (R', G', B') of RGB space from this

$a' (r', g', b')$ by the degree type.

[0055] $Y=0.30R+0.59G+0.11B$ $y=0.30r'+0.59g'+0.11b'$ $R'=r'*Y/y$ $G'=g'*Y/y$ $B'=b'*Y/y$

[0056] With this operation gestalt, thumbnail adjustment is performing color conversion in the location of the arbitration on a whole map using the color tone ready parameter corresponding to 1 to 1. Although this operation gestalt described 1 to 1, it does not matter even if a display top does not necessarily need to be 1 to 1, for example, a display top is distance of one and it has two or more distance internally.

[0057] Drawing 14 is drawing showing the situation of the processing in lightness / "contrast" adjustment. Each performs this actuation in common to each signal of R, G, and B.

[0058] Drawing 14 (a) is drawing showing the relation of the input signal in the case of adjusting lightness, and an output signal. When strengthening lightness, signal transformation equivalent to the curve described as "***" is performed, and when weakening lightness, signal transformation equivalent to the curve described as "dark" is performed.

[0059] Drawing 14 (b) is drawing showing the relation of the input signal in the case of adjusting contrast, and an output signal. When strengthening contrast, signal transformation equivalent to the curve described as "contrast strength" is performed, and when weakening contrast, signal transformation equivalent to the curve described as "contrast weakness" is performed.

[0060] Processing about "these lightness/contrast" may be carried out to real time using the formula equivalent to the curve mentioned above, and may be performed using the table created beforehand. Moreover, as shown in drawing 14 (c), you may process by compounding the table of the above-mentioned lightness/contrast.

[0061] Next, explanation of the output setting screen in this operation gestalt is given using drawing 17. 171 in drawing 17 is an image displayed on the external display 4 through a display 14 like drawing 9, and is also one of the setting sections 15 which switch whether printing mode is performed by the normal mode, or a catalog print performs. That is, if area shown in 172 is depressed and carried out with the above-mentioned pointing device, a catalog print will be set up, and it is the toggle switch with which the normal mode is set up at the same time a catalog print will be canceled, if it depresses again and carries out.

[0062] A catalog print is explained here using drawing 15. Drawing 15 is a catalog print, thumbnail adjustment, and drawing that usually explains printing.

[0063] 151 first shown in drawing 15 (a) is the image usually printed by printing. A user adjusts using the thumbnail 156 in the display 152 for adjustment which is shown in drawing 15 (b) and which was mentioned above so that this printing image may become a desired color. That is, eight surrounding images are depressed and carried out and a desired image is set as the current image 155. A user adjusts by changing a "tint" and "lightness/contrast" to arbitration here. It adjusts comparing non-adjusted the original image 153 and the current image 154 as this time above-mentioned. Although color adjustment can be mostly completed on the display screen by this thumbnail adjustment, when a stricter view is carried out, there is a case where **** differs from actual printing a little. A catalog print prints the image of nine sheets which performed color transform processing using the color tone ready parameter for printing corresponding to the color tone ready parameter for a display displayed on the thumbnail 156 now as shown in drawing 15 (c).

[0064] Since it matches with the color processing parameter for a display of the thumbnail image displayed on the display 4 by the color tone ready parameter transducer 134 in drawing 2, the color processing parameter for printing at this time is changed. That is, even when the difference in vision is among two or more screens on the display screen in the above-mentioned thumbnail as mentioned above for example, it can see for not being seemingly reflected in printing, even if

the difference in vision may not be acquired and it amends by the thumbnail in this case on the printing screen by the catalog print. The color tone ready parameter transducer 134 compensates this, and it amends in said color processing parameter so that the difference between the images looked at by two or more images obtained by said thumbnail and the same difference may be acquired also in a catalog print.

[0065]Here explains the conversion in the color tone ready parameter transducer 134. As having carried out point ** using drawing 12 about the "tint" adjustment in this operation gestalt, It changes into the color a on rg space (r, g, b) from the color A on RGB space (R, G, B) first, and it adjusts on this rg space, a' (r', g', b') is obtained, and it changes into A' (R', G', B') of RGB space from this a' (r', g', b') by the well-known formula.

[0066]As conversion in the color tone ready parameter transducer 134, although some examples are given, the following two examples are shown here.

[0067]That is, the 1st performs a' on this rg space (r', g', b') in the form changed into a'' (r'', g'', b''). A degree type performs this.

[0068] $r'' = \alpha_1 * r' g'' = \alpha_2 * g' b'' = \alpha_3 * b'$, however α_1 , α_2 and α_3 are the multiplier of arbitration.

[0069]The 2nd is about A' on RGB space (R', G', B'). It carries out in the form changed into A'' (R'', G'', B''). A degree type performs this.

[0070] $R'' = \beta_1 * R' G'' = \beta_2 * G' B'' = \beta_3 * B'$, however β_1 , β_2 and β_3 are the multiplier of arbitration.

[0071]A exponentiation etc. is sufficient although this operation gestalt showed the example by addition with a multiplier.

[0072]Thus, the color processing parameter for a display is changed into the color processing parameter for printing in the color tone ready parameter transducer 134.

[0073]On a catalog print, it is processed so that it can print to the print sheet which reduces a former image to 1/9 or less, and prints by the normal mode. 158 is the image processed using the current parameter for printing, and is printed using this parameter by the normal mode. 159 is the image processed using the color tone ready parameter for printing which changed the parameter for a display corresponding to 156 in a thumbnail by the color tone ready parameter transducer 134.

[0074]On the catalog print in this operation gestalt, when the "tint" is chosen in drawing 15 (b) and "the lightness/contrast" of a "tint" are chosen, it processes using the color tone ready parameter for printing which changed the color tone ready parameter equivalent to the thumbnail of "lightness/contrast."

[0075]The information stored in the set point storing section 16 in drawing 2 is the information on any shall be chosen between the address information of the current image 92 in drawing 9, adjustment width-of-face information, the information for adjustment, and a "tint" and "lightness/contrast", and is the information on being a catalog print in drawing 3.

[0076]132 in drawing 2 switches the address information of a current image and circumference 8 image based on the above-mentioned current image address information, adjustment width-of-face information, lightness / "tint" and "contrast" information, and the information for adjustment, in order that it is the color tone ready parameter switch section 132, and the above-mentioned thumbnail display image may be generated to a display and it may generate the above-mentioned catalog print image on a catalog print.

[0077]The image processing section 133 performs processing which reduces and copies the former image 151 and puts them in order as mentioned above, and it processes it so that it can print to the print sheet which especially reduces a former image to 1/9 or less on a catalog print, and prints by the normal mode. [two or more] This image processing is not performed in the normal mode. The

information on this catalog printing mode or the normal mode is given from the set point storing section 16, as mentioned above.

[0078]The color processing section 131 performs color processing according to the given address information, and changes a RGB multiple-value signal into a CMYK binary signal. In order that the conversion in this color processing section 131 may perform the image processing for 1 page by 9 pages and the normal mode at the time of said thumbnail and said catalog print, a multiple-times call is carried out.

[0079]21 is the adjustment color transducer 21 which changes into the signal of rg space the RGB multiple-value signal inputted in tint adjustment as mentioned above, performs adjustment color conversion on rg space, changes into a RGB multiple-value signal, and is changed into a RGB multiple-value signal from a RGB multiple-value signal according to the set point in lightness / contrast adjustment.

[0080]24 is the color tone ready parameter storing section 24 for storing the color tone ready parameter for a display which is used for this adjustment and which was beforehand computed corresponding to the whole map mentioned above. That is, the color tone ready parameter corresponding to the address information given from said color tone ready parameter switch section 132 is given to the adjustment color transducer 21. This parameter for a display gives that by which delivery conversion was carried out to the color tone ready parameter transducer 134 which carried out point ** to the adjustment color transducer 21 at the time of printing. The above-mentioned color tone ready parameter is stored according to a "tint" and "lightness/contrast" the object exception which is a candidate for adjustment as mentioned above.

[0081]22 is the RGB->CMYK transducer 22 for changing a RGB multiple-value signal into a CMYK multiple-value signal, and performs processing of color matching brightness concentration conversion masking etc. using LUT (Look Up Table) etc. Fundamentally, this processing is performed using the parameter computed beforehand, in order to obtain ****-coincidence of a luminance signal and a concentration signal.

[0082]23 is the HalfToning (halftone processing) section 23 in order to change a CMYK multiple-value signal into a CMYK binary signal, and it processes using a well-known dither method or an error diffusion method.

[0083]Here, since it is processing required for printing about the RGB->CMYK transducer 22 and the HalfToning section 23, and it is unnecessary processing in case it displays on a display 4 through a display 14 by said thumbnail, the color processing section 131 does not perform these processings fundamentally at the time of a thumbnail. However, in order to aim at coincidence of printing and a display by the configuration, inverse transformation may be carried out to RGB from CMYK after the RGB->CMYK transducer 22, and this signal may be used as a status signal.

[0084]As explained above, according to this operation gestalt, reproduce the image which reduced the thumbnail, i.e., a former image, perform color processing to each with nine adjustment parameters for a display according to a "tint" and "lightness/contrast", and it arranges on the display screen. coincidence -- this -- the whole map in which the absolute location of nine adjustment parameters is shown being shown, and with the approach a POINTIGU device performs color adjustment alternatively using these display screensHow to print using nine parameters changed [parameter / for a display] using the approach of changing into printing in the thumbnail image currently displayed on the catalog print, i.e., this display screen, Based on the image and said printing result on said display screen, by moving a current image in the center of a thumbnailthis, since it has the approach of choosing one from eight color tone ready parameters, and performing color tone ready processing using this parameter to a former imageSelection becomes easy intelligibly sensuously to a user, and the color adjustment for obtaining a desired color can obtain efficiently the optimal printing result according to the purpose of use.

[0085]<The 2nd operation gestalt> The 1st operation gestalt constitutes to

establishing the color tone ready parameter conversion means for amending in the color processing parameter for a display so that the difference between the images look at by two or more images obtain by the thumbnail and the same difference may be acquire also in a catalog print so that the color processing parameter for displays and the corresponding color processing parameter for airline printers may be table-ize beforehand.

[0086]since it becomes it is intelligible and easy sensuously to a user to choose the color adjustment for making in agreement the difference in the vision on the screen in adjustment and the difference in the vision on printing with a color tone ready parameter conversion means, and obtaining a desired color according to the 1st operation gestalt -- high -- efficiency printing processing is attained. With the 1st operation gestalt, since it is necessary to change the color tone ready parameter for a display into the color tone ready parameter for printing at every processing, there is an improving point that the processing time at the time of a catalog print will become long. It is desirable to shorten similarly ideally time amount which color tone ready processing takes also in a catalog print also in a thumbnail. The 2nd operation gestalt is constituted in order to realize these.

[0087]As opposed to establishing the color tone ready parameter conversion means for changing the color tone ready parameter for a display into the color tone ready parameter for printing in the color processing section 131 with the 1st operation gestaltThe processing time concerning color adjustment is shortened by establishing the approach of table-izing beforehand the color processing parameter for displays, and the corresponding color processing parameter for airline printers, and memorizing them, in the color processing section 131.

[0088]Although the fundamental configuration is the same as that of the 1st operation gestalt mentioned above in the image processing system of the 2nd operation gestaltBy making it possible to table-ize the color processing parameter for indicating equipments beforehand prepared in the color processing section 131, and the corresponding color processing parameter for airline printers, and to memorize themIt ** for a user's purpose more and a point equipped with a high-speed color tone ready means differs from its control approach.

[0089]A hereafter different part from the 1st operation gestalt mentioned above is explained.

[0090]Drawing 3 is the block diagram showing the configuration of the image processing system of the 2nd operation gestalt concerning this invention. In drawing 3, it differs from the first operation gestalt in that 1311, the color tone ready parameter storing section 1311 for a display shown in 1312, and the color tone ready parameter storing section 1312 for printing were added to the color processing section 131.

[0091]The flow of the processing in the image processing of this operation gestalt is explained using > >69=7:///&N0001=737&N0552=9&N0553=000006" TARGET="tjitemdrw"> drawing 4.

[0092]The point that the color tone ready parameter storing section 1311 for a display and the color tone ready parameter storing section 1312 for printing were added in drawing 4 is a different part from the first operation gestalt.

[0093]When this adjustment is a thumbnail, as for the adjustment color transducer 21, the color tone ready parameter storing section 1311 for a display to this adjustment receives a color tone ready parameter from the color tone ready parameter storing section 1312 for printing, a catalog print or when it is usually printing. The color tone ready parameter change-over section 132 performs this change-over based on the information on the set point storing section 16. This processing is explained using drawing 6. In step S61, this color adjustment judges first whether it is an object for a display. In the case of a thumbnail, it is judged as forward here, and nine kinds of parameters from the color tone

ready parameter storing section 1311 for a display are elected in step S65. When it is judged that it is not an object for a display in step S61, in step S62, it judges whether it is a catalog printing mode. This is judged based on a setup of drawing 17 which carried out point **. When judged as a catalog printing mode, in step S64, nine kinds of parameters are elected from the color tone ready parameter storing section 1312 for printing. When it is usually judged as a print mode in S62, based on the current set point mentioned above in step S63, one parameter is elected from the color tone ready parameter storing section 1312 for printing.

[0094]In the 2nd operation gestalt, since the processing except the approach of storing the color tone ready parameter for a display in the color processing section 131 mentioned above, and the method of storing the color tone ready parameter for printing having been added is the same as the processing shown with the 1st operation gestalt mentioned above, explanation is omitted.

[0095]As explained above, in order to shorten similarly time amount which color tone ready processing takes also in a catalog print also in a thumbnail according to the 2nd operation gestalt, the more nearly optimal output can be obtained by forming the color tone ready parameter storing section 1311 for a display, and the color tone ready parameter storing section 1312 for printing in the color processing section 131.

[0096]<3rd operation gestalt> In the operation gestalt of the above 2nd, although the operation gestalt in the case of table-izing the color tone ready parameter for a display and the color tone ready parameter for printing, having them, and changing and using this table in the case of color adjustment was described, corresponding to the class of an indicating equipment and airline printer, it constitutes from the 3rd operation gestalt so that said table according to the property of this equipment may be prepared.

[0097]since according to the 1st and 2nd operation gestalt the object for a display and the color tone ready parameter for printing can be prepared and color adjustment can be performed -- high -- efficiency printing processing is attained. However, the following problems arise in this case. That is, with the 1st and 2nd operation gestalt, since the object for a display and the color tone ready parameter for printing which are held with an image processing system are preparing only every one sort each, when the display 4 and airline printer 3 which are an external device linked to an image processing system are changed, they cannot perform suitable color adjustment for which it asks from the difference in the color property of this equipment.

[0098]It is desirable to constitute so that said object for a display and the color tone ready parameter storing table for printing may be ideally prepared according to the class of an external device called the display 4 and airline printer 3 which are connected to this image processing system and this table may be changed according to this class.

[0099]The 3rd operation gestalt is constituted in order to realize these. With the 3rd operation gestalt, it is made the structure where it can respond to two or more external devices, by establishing the approach of storing the object for a display, and the color tone ready parameter table for printing according to the class of external device in the color processing section 131, and the approach of changing this table.

[0100]In the image processing system of the 3rd operation gestalt, although the fundamental configuration is the same as that of the 2nd operation gestalt mentioned above, a point equipped with the setting means which made a user convenience high differs from its control approach by preparing said object for a display, and the color tone ready parameter storing table for printing according to the class of external device.

[0101]Hereafter, a different part from the 2nd operation gestalt is explained.

[0102]Drawing 8 is the block diagram showing the configuration of the image processing system of the 3rd operation gestalt concerning this invention. In drawing 8, it differs from the 2nd operation gestalt in that the tables 1313 and

1314 according to model were added in 1311 contained in the color processing section 131, the color tone ready parameter storing section 1311 for a display shown in 1312, and the color tone ready parameter storing section 1312 for printing.

[0103]Here explains the flow of the processing in the image processing of this operation gestalt using drawing 5.

[0104]The point that the table 1314 of inker classification was added to the color tone ready parameter storing section 1311 for a display in drawing 5 by the table 1313 according to display model and the color tone ready parameter storing section 1312 for printing is a different part from the 2nd operation gestalt.

[0105]When this adjustment is a thumbnail, as for the adjustment color transducer 21, the color tone ready parameter storing section 1311 for a display to this adjustment receives a color tone ready parameter from the color tone ready parameter storing section 1312 for printing, a catalog print or when it is usually printing. At this time, the color processing parameter according to the model which is making current connection of the display which is an external device, and the airline printer is received. The color tone ready parameter change-over section 132 performs this change-over based on the information on the set point storing section 16.

[0106]The example at the time of a setup of an external device is shown in drawing 7. 71 is the field of external device selection and is displayed by the display 14 on said display. The class of monitor which is making current connection in 72 is chosen. Selectors are enumerated by 72 with a pull down menu, and a user chooses. In 73, the class of airline printer which is making current connection is chosen. Selectors are similarly enumerated with a pull down menu, and a user chooses 73. Although these selections showed the gestalt which a user is made to choose by displaying the above-mentioned selection screen in the setting section and a display by this example, it is also possible to recognize an external device automatically, for example by providing a certain discernment function between an external device and this image processing system in a network environment. This situation is shown in drawing 16. That is, when this image processing system and two or more external devices are connected to the network, information is exchanged between this external device and this image processing system, and the equipment which serves as a processing object first is decided. In this example, about a display, these processings are performed in the printing section in an image processing system about the display in an image processing system, and an airline printer, for example, Display A and the airline printer a are the external processor of KARENTO. The processing section of dedication may be prepared about this processing. Reference is not made about the detail of an exchange of information required for this processing here.

[0107]The information set up by the selection means of an external device as mentioned above is stored in the set point storing section 16. The color tone ready parameter change-over section 132 elects the object for a display and the color tone ready parameter for printing with which color tone ready parameter storing circles correspond based on this information, and sends them out to the adjustment color transducer 21.

[0108]In the 3rd operation gestalt, since the processing except the approach of storing the color tone ready parameter for a display according to the class of external device in the color processing section 131 mentioned above, and the method of storing the color tone ready parameter for printing having been added is the same as the processing shown in the 2nd example mentioned above, explanation is omitted.

[0109]As explained above, it can become possible according to the 3rd operation gestalt to change an external device easily, and time amount which color tone ready processing takes also in a catalog print also in a thumbnail also in this case can be shortened similarly, and the optimal efficient output can be obtained.

[0110]In addition, even if it applies each operation gestalt mentioned above to

the system which consists of two or more devices, it may be applied to the equipment which consists of one device. Moreover, it cannot be overemphasized that this invention can be applied also when attained by supplying a program to a system or equipment. In this case, the storage which stored the program concerning this invention will constitute this invention. And it operates by the approach by which the system or equipment was defined beforehand by making the program read into a system or equipment from this storage.

[0111]

[Effect of the Invention]As explained above, according to this invention, a user can set up color processing conditions easily.

[0112]Moreover, color processing conditions can be set more as high degree of accuracy by forming in juxtaposition two or more images by which color processing was carried out in consideration of ***** of a display image and a formation image.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is the block diagram showing the example of an image processing system configuration concerning this invention.

[Drawing 2]It is the block diagram showing the flow of processing of the image processing concerning this invention.

[Drawing 3]It is the block diagram showing the example of an image-processing configuration in the 2nd operation gestalt concerning this invention.

[Drawing 4]It is the block diagram showing the flow of processing of the image processing system in the 2nd operation gestalt concerning this invention.

[Drawing 5]It is the block diagram showing the flow of processing of the image processing system in the 3rd operation gestalt concerning this invention.

[Drawing 6]It is the flow chart which shows the flow of the image processing in the 2nd operation gestalt in this invention.

[Drawing 7]It is an example of a display about the external device selection in the 3rd operation gestalt in this invention.

[Drawing 8]It is the block diagram showing the example of an image processing system configuration in the 3rd operation gestalt concerning this invention.

[Drawing 9]It is drawing explaining the thumbnail in the setting section in this invention.

[Drawing 10]It is drawing explaining the whole map and cursor in the thumbnail concerning this invention.

[Drawing 11]It is drawing explaining the thumbnail of the lightness/contrast in the setting section in this invention.

[Drawing 12]It is drawing explaining change of the color space in the color adjustment in this invention.

[Drawing 13]It is drawing showing rg space of color adjustment and the relation of a whole map to this invention.

[Drawing 14]It is drawing explaining transform processing of the lightness/contrast in this invention.

[Drawing 15]It is drawing explaining the relation between the thumbnail in this invention, and a catalog print.

[Drawing 16]It is drawing explaining the external device selection in the network in the 3rd operation gestalt in this invention.

[Drawing 17]It is drawing showing an example of the setting section in this invention.

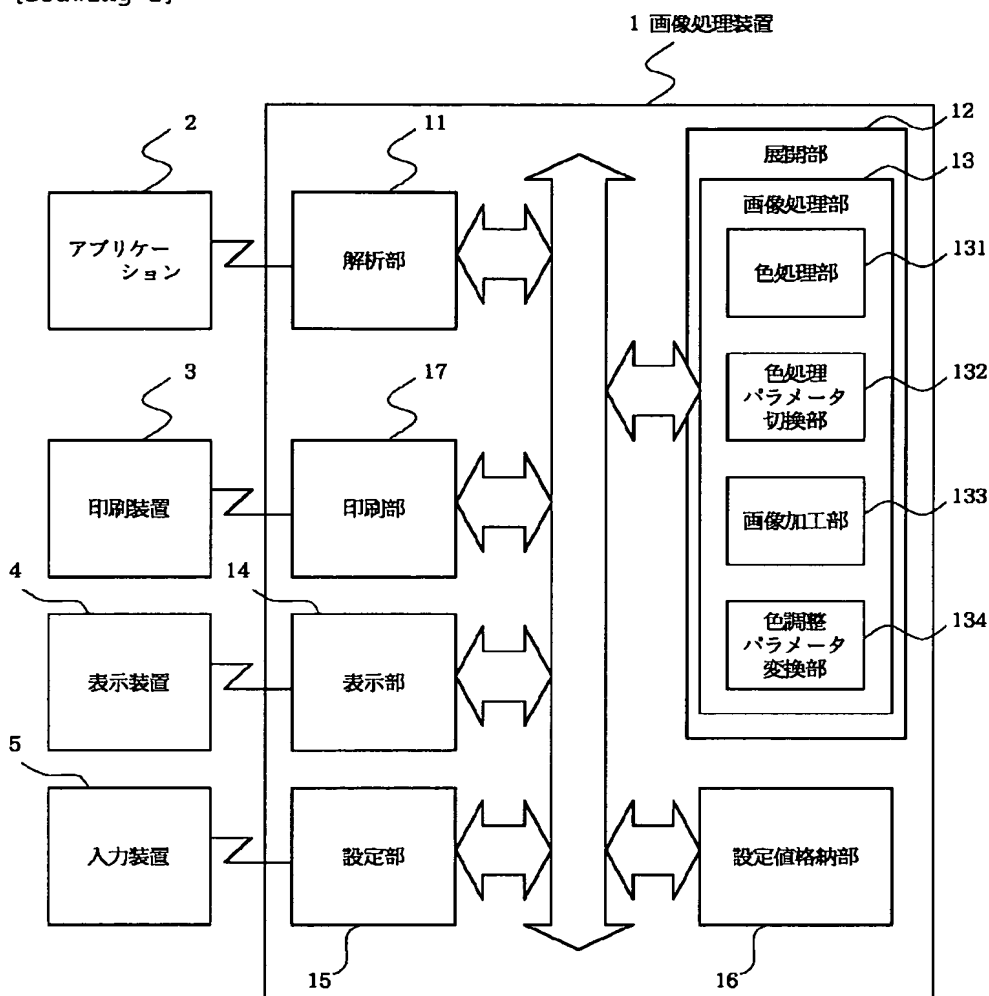
[Drawing 18]It is drawing showing the example of the conventional color

adjustment concerning this invention.

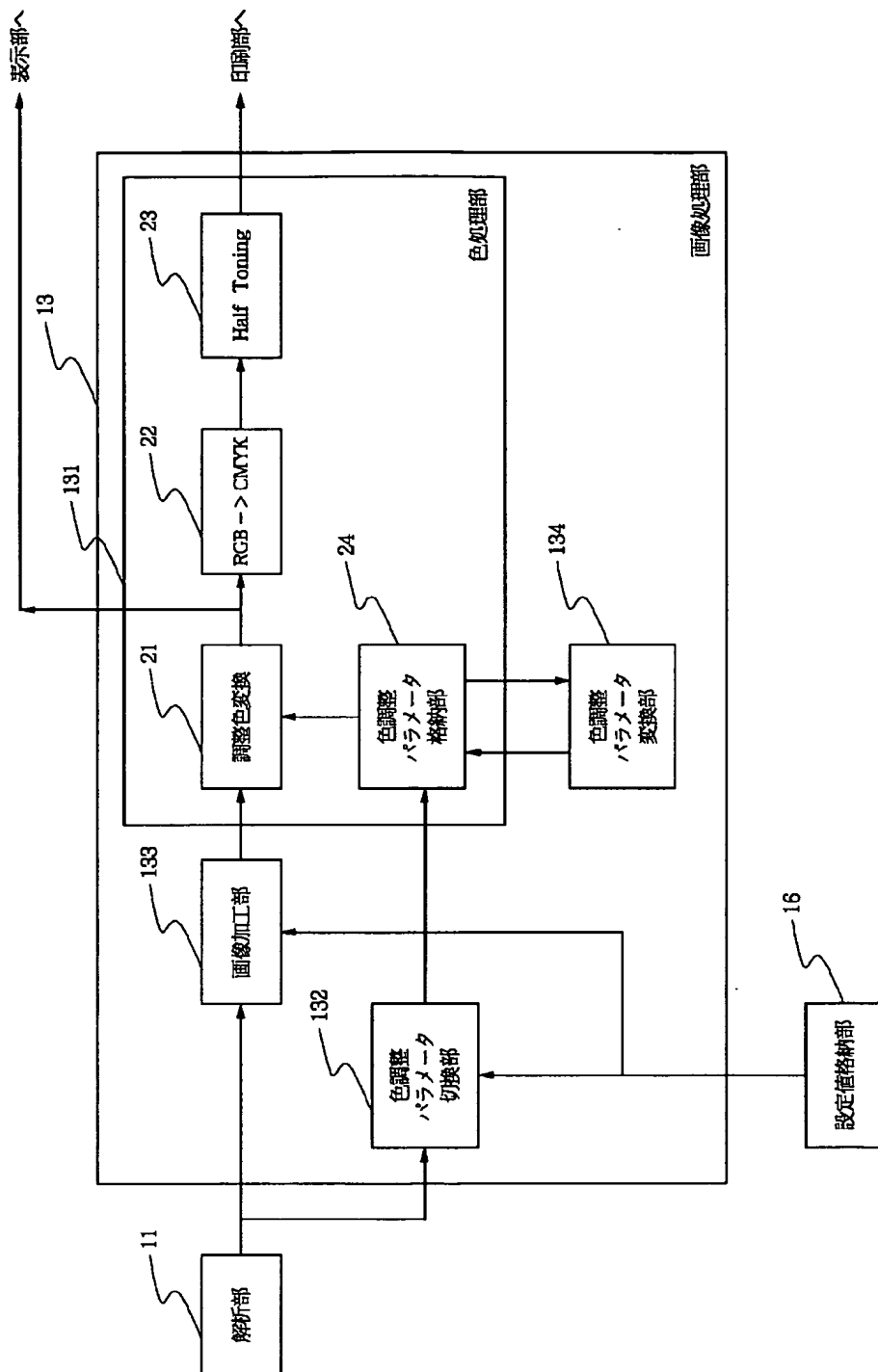
[Drawing 19] It is drawing showing the flow of color processing conventionally concerning this invention.

DRAWINGS

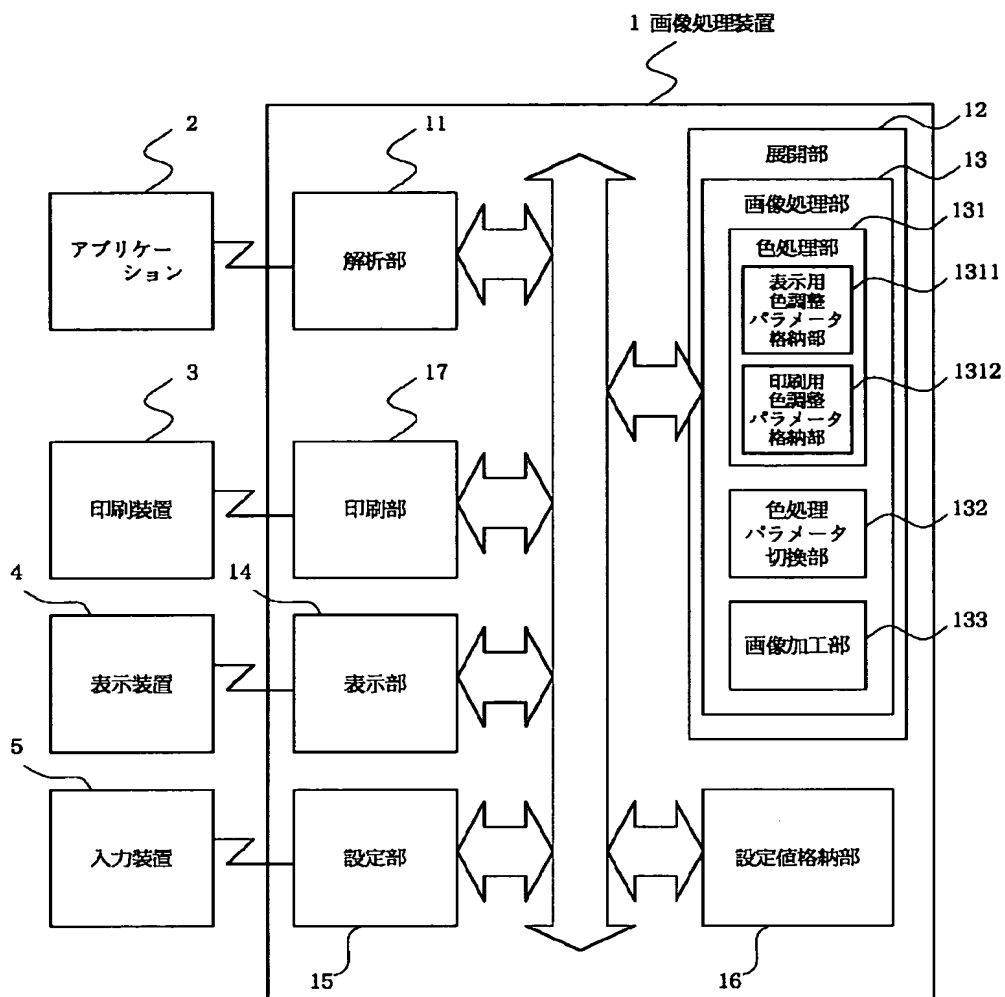
[Drawing 1]



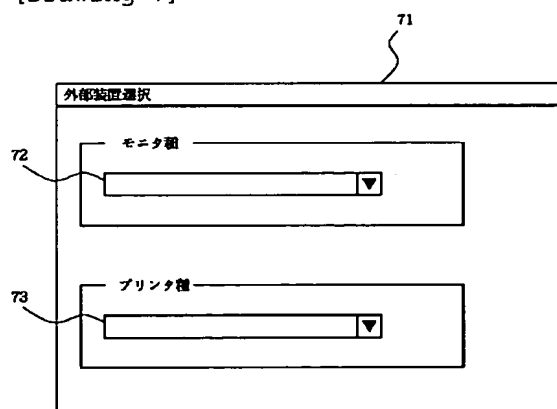
[Drawing 2]



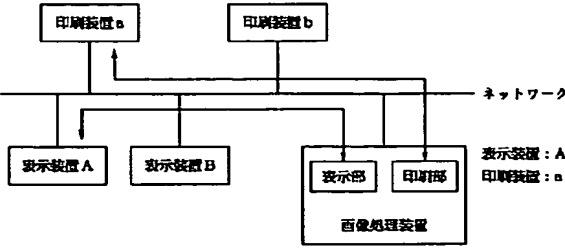
[Drawing 3]



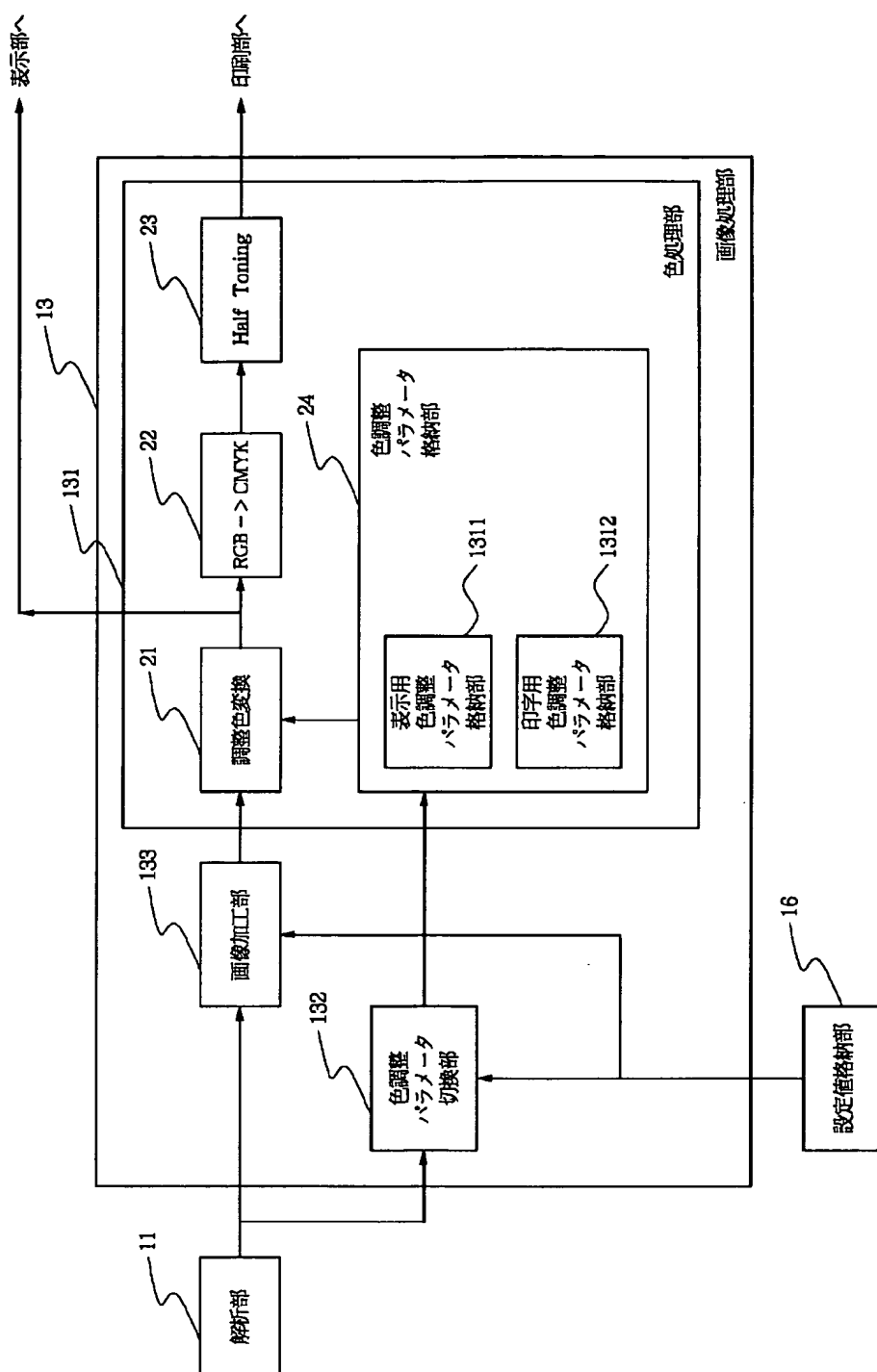
[Drawing 7]



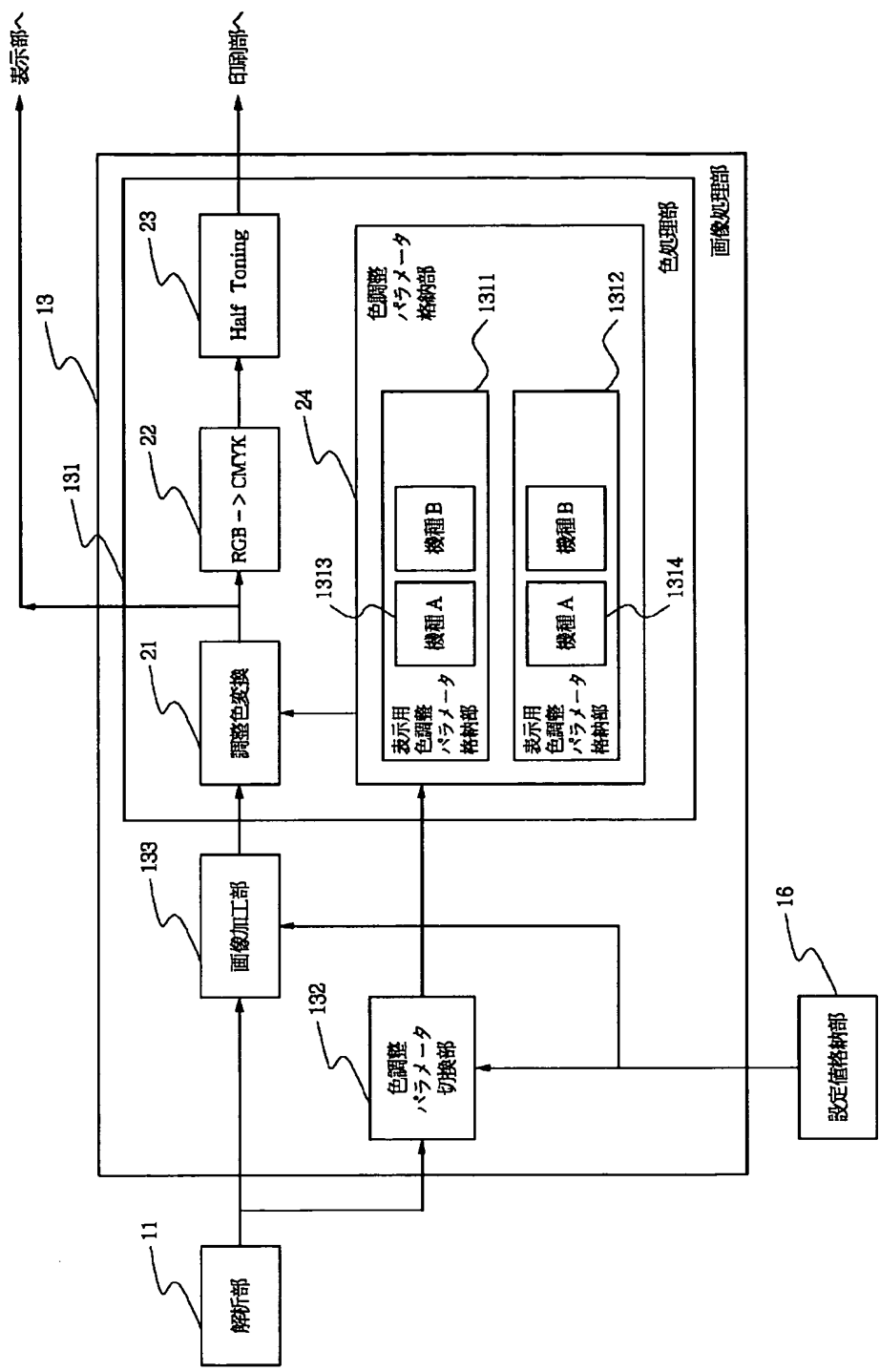
[Drawing 16]



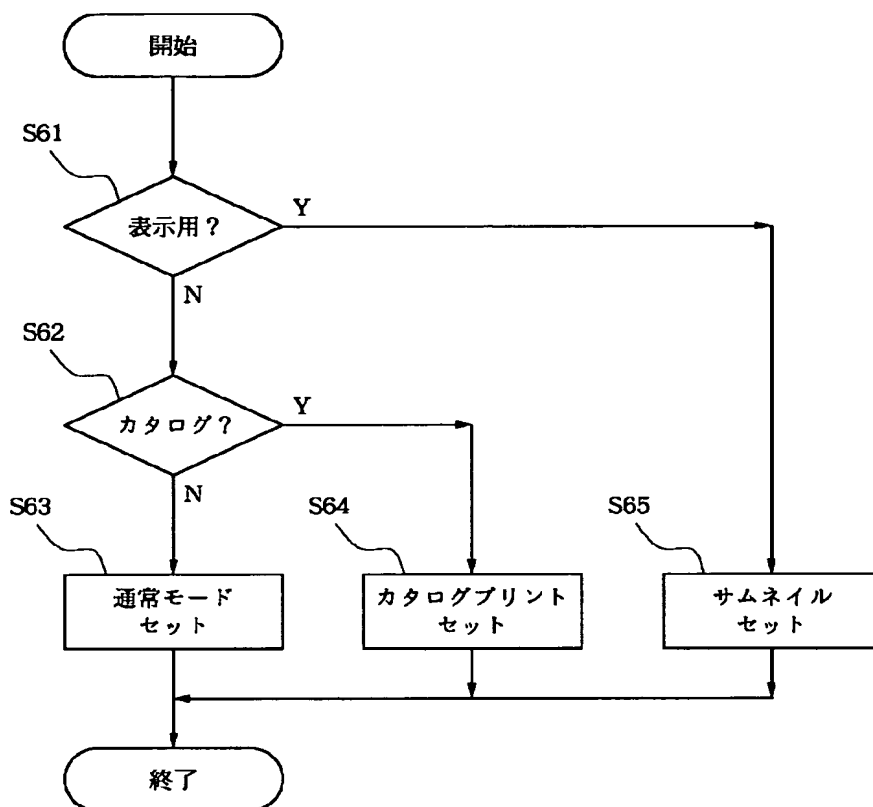
[Drawing 4]



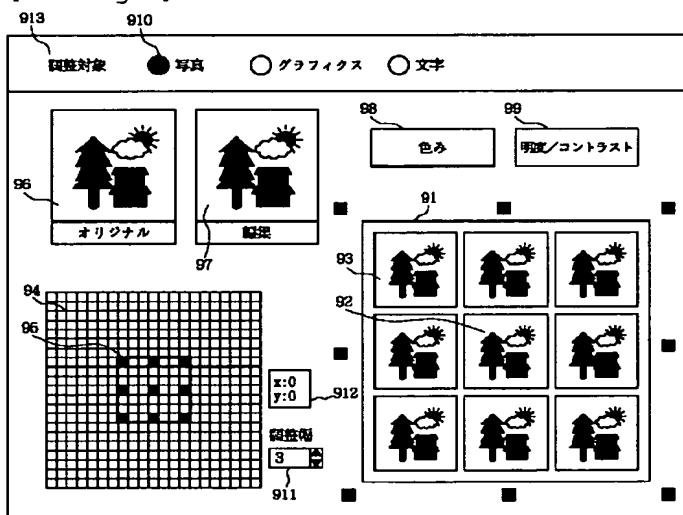
[Drawing 5]



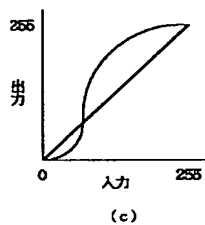
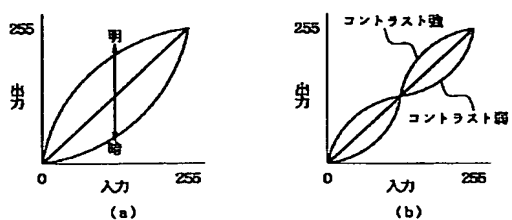
[Drawing 6]



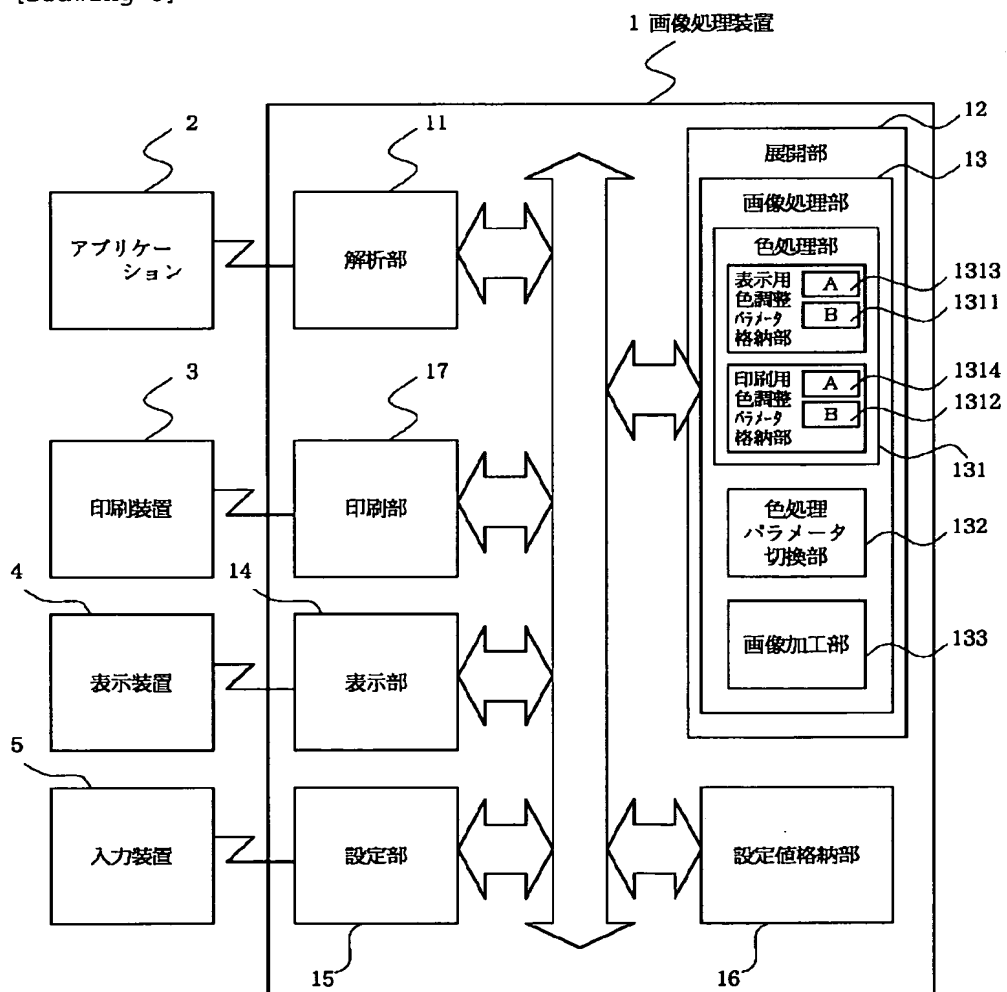
[Drawing 9]



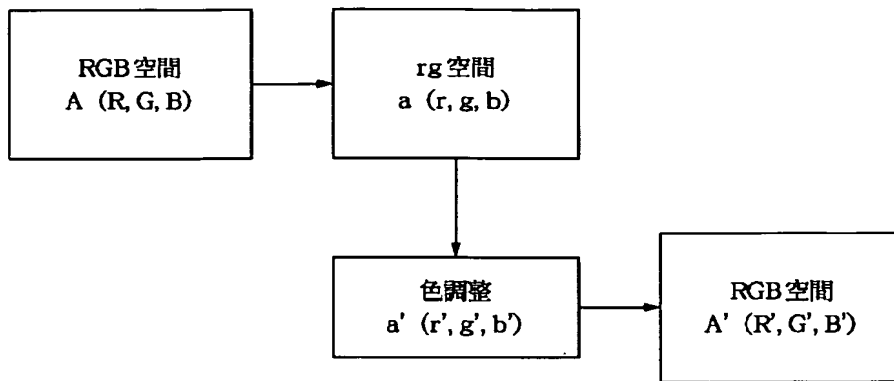
[Drawing 14]



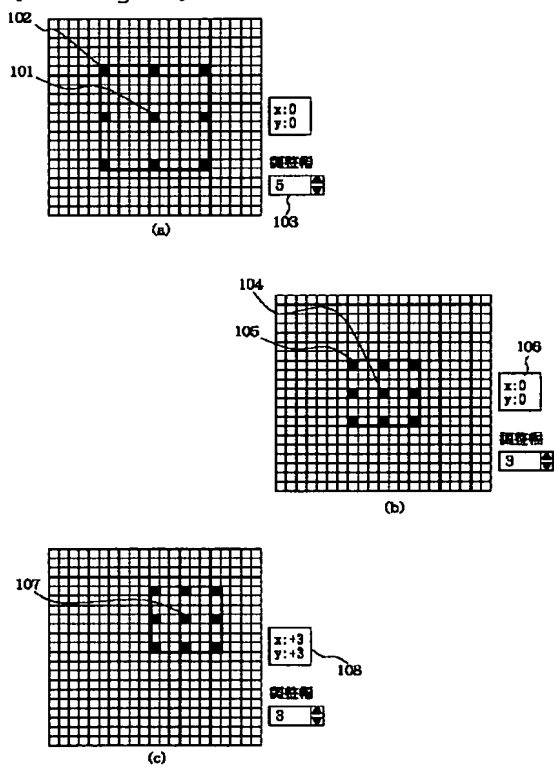
[Drawing 8]



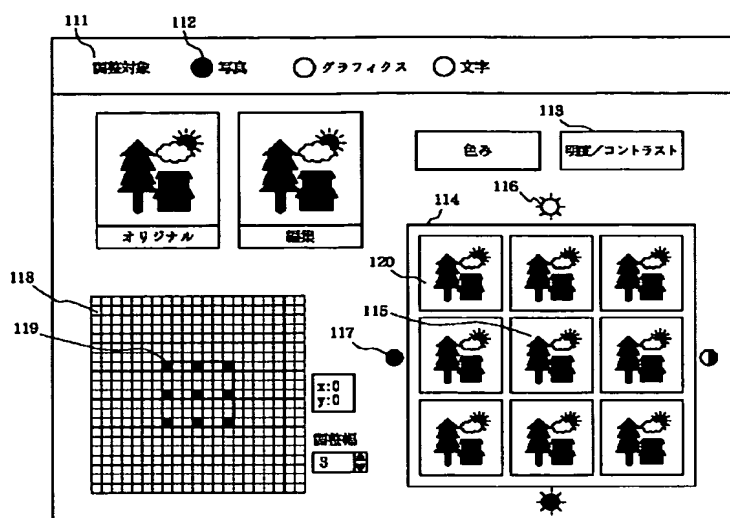
[Drawing 12]



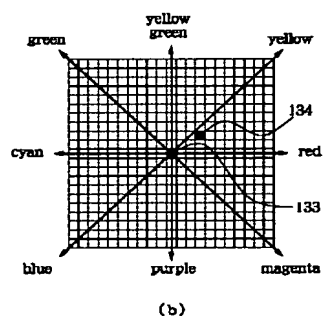
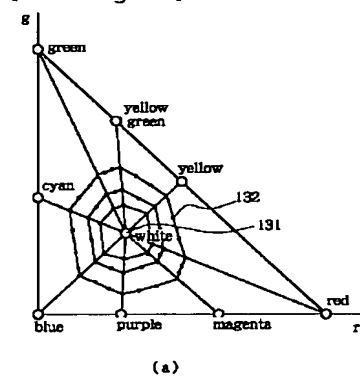
[Drawing 10]



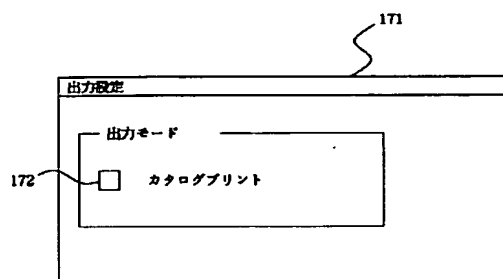
[Drawing 11]



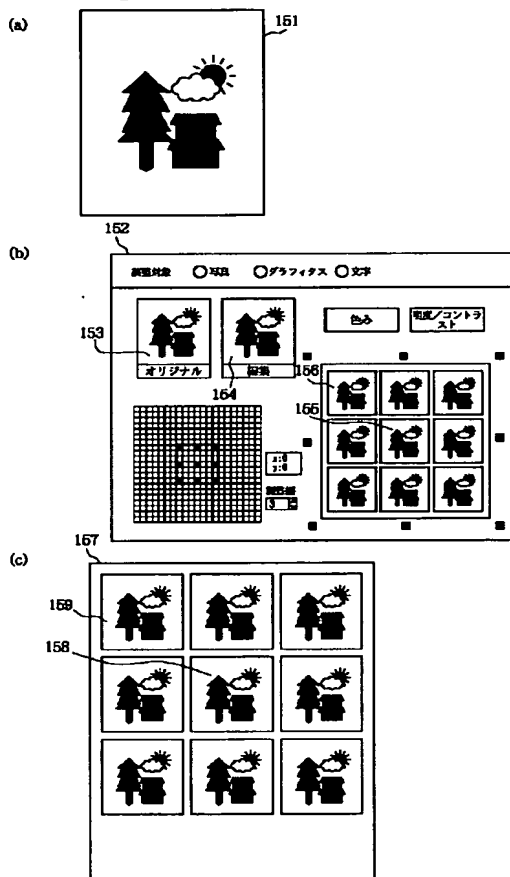
[Drawing 13]



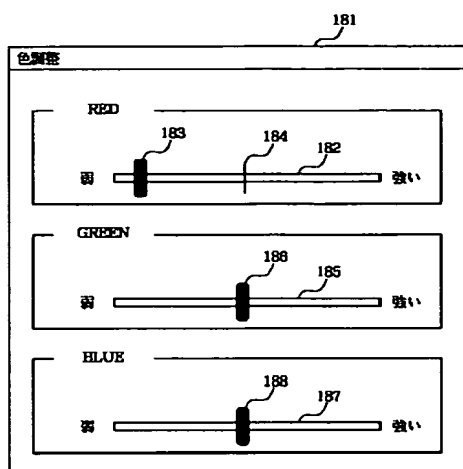
[Drawing 17]



[Drawing 15]



[Drawing 18]



[Drawing 19]

